DOCUMENT RESUME

ED 054 510	24	CG 006 651
AUTHOR	Nesselroade, John R.; Baltes, Paul B.	
TITLE	A Study of Ontogenetic and Generational Change in Adolescent Personality by Means of Multivariate Longitudinal Sequences. Final Report.	
INSTITUTION	West Virginia Univ., Morgantown.	
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.	
BUREAU NO	BR-9-0289	
PUB DATE	Aug 71	
GRANT	OEG-0-9-580289-4415	
NOTE	48p.	
EDRS PRICE	MF-$0.65 HC-$3.29	
DESCRIPTORS	*Adolescents; *Cultural Environment; Environmental Influences; Group Membership; *Longitudinal Studies; Maturation; *Personality Assessment; Psychological Tests; *Secondary School Students; Social Intluences; Teenagers	

ABSTRACT

This report covers the initial phase of a longitudinal study of adolescent personality, intended to examine the impact of cultural change on adolescent personality development. The High School Personality Questionnaire (Cattell), the Personality Research Form (Jackson) and the Primary Mental Abilities Test battery (Thurstone and Thurstone) were administered to secondary school students to yield temperament and ability dimensions (only the former is reported on in this intermediate report). Separating ontogenetic (individual) and generational (historical) sources of temporal change was accomplished by application of longitudinal sequences consisting of a series of short-term longitudinal studies, analyzed by Schaie's time-sequential method. The results lend strong support to the argument that, due to potential generational change, cross sectional age gradients are fallacious indicators of true age change. Systematic personality differences were clear between cohorts born but a few years apart. The nature and status of adolescent personality development appear to be dictated less by age-related maturational components than by the type of cultural ecology which is setting the environmental milieu for all adolescents at a given point of time. (KS)

ED054510

PA 24
BR 9-0289
C.G

FINAL REPORT
Project No. BR 9-0289
Grant No. OEG-0-9-580289-4415

A STUDY OF ONTOGENETIC AND GENERATIONAL CHANGE IN ADOLESCENT PERSONALITY BY MEANS OF MULTIVARIATE LONGITUDINAL SEQUENCES

John R. Nesselroade and Paul B. Baltes
West Virginia University
Morgantown, West Virginia 26506

August 1971

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

CG 006 651

Final Report

Project No. BR9-0289
Grant No. OEG-0-9-580289-4415

A Study of Ontogenetic and Generational Change In Adolescent Personality by Means of Multivariate Longitudinal Sequences

John R. Nesselroade and Paul B. Baltes
West Virginia University
Morgantown, West Virginia 26506

August 1971

The research reported herein was performed pursuant to a grant with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgement in the conduct of the project. Points of view or opinions do not, therefore, necessarily represent official Office of Education position or policy.

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

TABLE OF CONTENTS

		Page
I.	PREFACE	1
II.	SUMMARY	3
	A. Objective	3
	B. Design	3
	C. Results	3
	D. Conclusions	3
III.	INTRODUCTION	5
	A. Some History	5
	B. Cohort Differences and Adolescent Personality	6
	C. Statement of Problem	7
IV.	METHOD	9
	A. Design	9
	B. Measurement Variables	11
	C. Procedures and Subjects	13
	D. Data Analysis	13
	1. Structural and Quantitative Change	13
	2. Ontogenetic and Generational Change	15
	3. Present Analysis	17
V.	RESULTS	19
	A. Overview of Results	19
	B. Scale-Specific Results	19
	C. Control Group Data	22
		27
VI.	DISCUSSION AND CONCLUSIONS	29
	A. Cross-Sectional vs. Longitudinal Data	29
	B. Implications for Adolescent Development	29
	C. Implications for Monitoring Cultural Change	30
VII.	REFERENCES	31
VIII.	APPENDIX A: PROJECT-RELATED PUBLICATIONS	37

LIST OF TABLES

		Page
Table 1.	Short-Term Longitudinal References for the Study of Adolescent Development.	10
Table 2.	Measurement Systems: Primary Mental Abilities, High School Personality Questionnaire, Personality Research Form.	12
Table 3.	Distribution of Subjects by Cohort, Sex, and Experimental Condition.	14
Table 4.	Examples of 3 Basic Models-Strategies Using a Data Matrix Involving Three Ages, Three Cohorts, and Three Times of Measurement.	16
Table 5.	Cross-sequential Analysis of Adolescent Development.	18
Table 6.	Summary of Analyses of Longitudinal Data	20
Table 7.	Summary of Analyses of Longitudinal vs. Drop-out Group.	28

LIST OF FIGURES

Figure 1.	Comparison of Cross-Sectional with Longitudinal Gradients for Factor B.	22
Figure 2.	Comparison of Cross-Sectional with Longitudinal Gradients for Factor C.	23
Figure 3.	Comparison of Cross-Sectional with Longitudinal Gradients for Factor F.	24
Figure 4.	Comparison of Cross-Sectional with Longitudinal Gradients for Factor G.	24
Figure 5.	Comparison of Cross-Sectional with Longitudinal Gradients for Factor I.	25
Figure 6.	Comparison of Cross-Sectional with Longitudinal Gradients for Factor O.	26
Figure 7.	Comparison of Cross-Sectional with Longitudinal Gradients for Factor Q_2.	26

I. PREFACE

The present study was initiated both for substantive and methodological reasons. From a substantive perspective, a review of the literature suggested a tremendous need for objective information on personality development through the period of adolescence, particularly within a framework of structured measurement. From a methodological viewpoint, the period of adolescence -- one of rapid change and great sensitivity toward cultural innovations -- appeared to be a prime candidate for the examination of recent developmental designs oriented toward separating ontogenetic from generational change components.

This report covers the initial working phase of a longitudinal study of adolescent personality launched in 1969. The primary objective of this research project is the examination of the impact of cultural change on personality development in adolescents by means of a series of short-term longitudinal studies covering the age range from 13-18 years. The entire project involves three times of measurement (1970, 1971, 1972). Since at the present time, we are still awaiting the third time of data collection and, of course, the main data analyses, this report is necessarily incomplete and most of the results are preliminary.

It is felt, however, that -- in addition to the necessary closing-out of budgetary phases -- this report fulfills a variety of functions. First, it appears that the objectives and designs of any long-term longitudinal study should be summarized prior to the attainment of final results in order to expedite scientific communication. Second, such a report provides an explicit vehicle for both internal and external monitoring and evaluation; procedures that appear of crucial significance in complex longitudinal research. Finally, the substantive emphasis on cultural change phenomena in the present study makes it imperative to communicate findings publicly before they are of historical value only.

In accordance with the intermediate status of the study, this report focuses on a description of the entire research plan in the introductory sections. The later sections, however, will deal with selected results from the first two times of measurement (1970, 1971). It was decided to present the data from one instrument (HSPQ) comprehensively rather than give a potpourri of all analyses conducted thus far in conjunction with the present project.

It may be worthwhile mentioning that at least two other large-scale longitudinal studies of adolescence currently in progress are somewhat similar to the present project: Youth in Transition (Bachman, Kahn, Mednick, Davidson, & Johnston, 1969) and Project Talent (Flanagan & Cooley, 1966; Flanagan, Dailey, Shaycoft, Gorham, Orr, & Goldberg, 1962). In neither study, however, is the focus on structured personality systems, nor is the primary attention on the simultaneous analysis of ontogenetic and generational change components. Neverthe-

less, it can be expected that both studies and the present one will provide complementary information.

Success of a research project of this magnitude depends a great deal upon the cooperative efforts of numerous people. We gratefully acknowledge the cooperation given by the County School Superintendents and their assistants, by the school principals and their assistants, by the teachers and, certainly, by the students in the West Virginia Counties of Harrison, Wetzel, and Wood. We also wish to express our appreciation for a job well done to our graduate assistants -- John C. Friel and Erich W. Labouvie, to our clerical staff -- Mrs. Carolyn Blose and Mrs. Nancy Everly, and to numerous erstwhile personnel who assisted with data collection.

II. SUMMARY

A. Objective. This research project, the first budgetary phase of which is now finished and forms the focal point of the present report, centers on the impact of cultural change on adolescent personality development. In planning this research project two central themes were interwoven into the design which ultimately emerged. The first concerned the deplorable lack of solid data, obtained and analyzed within a structured, multivariate measurement framework, on adolescent personality development. The second was that the vast majority of data on adolescence are collected in simple cross-sectional or longitudinal research designs that fail to distinguish between ontogenetic and generational change components. Through the use of structured measurement devices -- the High School Personality Questionnaire (Cattell), the Personality Research Form (Jackson), and the Primary Mental Abilities test battery (Thurstone & Thurstone) -- each of which yields measures on a well defined set of temperament or ability dimensions, we attempted to meet the first condition for obtaining a sound set of data on adolescent personality. The second condition viz, separating ontogenetic and generational sources of temporal change was accomplished by application of longitudinal sequences consisting of a series of short-term longitudinal studies.

B. Design. Specifically, the design varied age (11-18), sex, and cohort membership (1951-1957) across almost 2,000 subjects randomly sampled from the junior and senior high schools in three West Virginia counties (Harrison, Wetzel, Wood). The total design covers three occasions of measurement (1970, 1971, 1972); selected data from the first two being reported here. Control groups to permit the detection of retest effects and selective attrition of subjects are included in the design. The present (intermediate) report focuses on one measurement instrument only, the 14 scales of the High School Personality Questionnaire. By means of Schaie's time-sequential method, data from the longitudinal group -- subjects measured in both 1970 and 1971 -- were analyzed in a series of 5 (cohort) by 2 (sex) by 2 (time of measurement) analyses of variance. A second set of analyses centered about the examination of attrition retest and effects. First, data from the longitudinal group (1971 scores) and from the posttest control group were analyzed in a set of 5 (cohort) by 2 (sex) by 2 (group) analyses of variance in order to check potential testing effects. Second, the longitudinal group and the drop-out group were compared on their initial 1970 scores using a 5 (cohort) by 2 (sex) by 2 (group) design.

C. Results. The results lend strong support to the argument that, due to potential generational change, cross-sectional age gradients are fallacious indicators of true age change. In fact, in all cases where significant ontogenetic age changes were indicated, the cross-sectional gradients did not correspond to the longitudinal trends. Specifically, main effects of time, indicative of longitudinal age change (from 1970 to 1971) for each of the five cohorts (12-13, 13-14, 14-15, 15-16, 16-17), were found for 5 HSPQ dimensions. Since none of the cohort by

time interactions was significant these results may be summarized as indicating that, regardless of cohort membership, adolescents in 1971 were more intelligent (B), more emotionally stable (C), higher on Surgency (F), lower on Superego (G), more tough-minded (I), more self-assured (O), and more lax and uncontrolled (Q_2) than they were in 1970.

Significant cohort effects (in the present design indicative of both cohort and cross-sectional age differences) were found for Intelligence (B), Premsia (I), Coasthenia (J), and Self-sufficiency (Q_2). Significant sex effects which, incidentally, accounted for the major portion of variability between subjects, were obtained on 12 of the 14 dimensions. Interestingly, for several of the factors the data indicate that sex differences emerge prior to age 12.

The comparative examination of the control groups substantiated the internal validity of the main analyses. The posttest control group did not differ from the longitudinal group on any of the 14 scales indicating that these cohort-specific, one-year longitudinal age changes (1970-1971) are not due to retest effects. Moreover, the analysis for selective drop-out effects yielded such effects on three of the 14 scales only. Drop-outs were shown to be less intelligent, lower on Super-ego, and lower on Self-sentiment than the retestees defining the longitudinal group.

D. Conclusions. Results reported here clearly support both the methodological and substantive rationales underlying the present study. Due to the widely demonstrated effects of components of generational change, cross-sectional methodology cannot be relied upon to give an accurate portrayal of the nature of ontogeny during adolescence. Whereas earlier research has shown systematic differences between cohorts born several decades apart in adult samples, the present data suggest dramatic differences in adolescent change patterns between cohorts born a few years apart. From a substantive perspective, it is particularly noteworthy that conceptions of putatively stable and invariant transition sequences in adolescent development, however theoretically compelling, are not supported by the present data. On the contrary, the nature and status of adolescent personality development appears to be less dictated by age-related maturational components than by the type of cultural ecology which is setting the environmental milieu for all adolescents at a given point in time.

Analysis strategies capable of disentangling ontogenetic (individual) and generational (historical) change components must be employed if we are to effectively grasp both the nature of ontogenetic change during adolescence and the role which societal influences play in shaping this change. In the present context, the upcoming third time of measurement (1972) as well as the completion of the ongoing analysis of the remaining measurement instruments will provide us with more complete information on the directionality and stability of the change patterns observed and the generalizability of the present findings.

III. INTRODUCTION

A. Some History

During the recent decade we have witnessed an increasing concern with analyzing the relationships between individual (ontogenetic) and historical (generational) development (e.g., Riegel, 1969; 1971). Earlier developmental research appeared to provide us, for the most part, with relatively robust information on ontogenetic patterns that held up in subsequent decades. Present cultural change, however, appears so rapid and pervasive that results from "one-shot" cross-sectional or longitudinal studies are threatened with obsolescence before they can be marketed for the scienfific consumer. In fact, whereas such cultural acceleration phenomena were previously treated under the heading of 'secular' trends (e.g., Bakwin, 1964; Muuss, 1970), present-day evidence on the rate of 'changing ontogeny' suggests that terms like 'yearly' or 'decennial' trends may be more fitting, particularly where the behavior systems under consideration are largely associated with environmental conditions.

Originally, the impact of cultural change on psychological ontogeny was treated primarily as a methodological issue, the effect of which jeopardizes both the comparability and validity of cross-sectional and longitudinal designs. Thus, developmental researchers were plagued for a considerable time by the discrepant findings resulting from the application of longitudinal and cross-sectional methodology (e.g., Damon, 1965; Kuhlen, 1963).

In general, it has been shown that both the cross-sectional and longitudinal method lack a variety of controls and that their internal and external validity (Campbell & Stanley, 1963) are differentially affected by a number of error sources such as selective sampling, selective survival, selective drop-out, testing effects, and generation (cohort) differences. Both Baltes (1968) and Schaie (1965) argue that discrepancies and contradictions in the conclusions derived from cross-sectional and longitudinal studies are consequences of violations of basic assumptions implicit in these designs. With a focus on the issue of generational or cultural change, they propose (stimulated by earlier work, e.g., Bell, 1953; Welford, 1961; Davies, 1954) to combine several cross-sectional and longitudinal studies into more complex developmental designs, so-called sequential strategies. The application of such sequential strategies, consisting of serial examinations of the ontogeny of successive generations, makes it possible to estimate the relative significance of ontogenetic (individual) and generational (historical) change components.

Initial implementations of such sequential strategies (e.g., cross-sectional or longitudinal sequences), though almost exclusively conducted in the area of intelligence, have clearly substantiated the empirical relevance of generation effects in ontogenetic considerations. Moreover, in light of the current impact of social change and the increasing cognizance of individual-society interactions, the issue of

generational differences has become a substantively compelling phenomenon. In fact, all studies conducted thus far (e.g., Baltes, Baltes & Reinert, 1970; Baltes & Reinert, 1969; Nesselroade, Schaie & Baltes, 1972; Riegel, Riegel & Meyer, 1967; Schaie, 1970; Schaie & Strother, 1968) have shown dramatic differences between the ontogenetic patterns of different generations or cohorts (e.g., subjects born at different times). Although the available evidence does not allow one to specify the substantive determinants (maturational vs. experiential, etc.) for such generational change in intelligence, the overriding magnitude of the obtained cohort differences pleads for a careful scrutinization of similar social change components in other classes of behavior as well. Thus, Schaie's (1965) original assertion that practically all age-developmental literature needs re-examination in light of potential cohort differences is convincingly supported by initial empirical findings.

B. Cohort Differences and Adolescent Personality

The systematic analysis of generational change in psychological variables, with few exceptions centering on attitudes and values (e.g., Broderick & Fowler, 1961; Greenstein, 1964; Harris, 1957; Jones, 1960), has been restricted to adult subjects. For a number of reasons, however, such inquiries into the relationships between ontogenetic and generational change components appear especially promising in the area of adolescent personality development.

First, there is a rich body of data on secular trends in the rate of biological development during adolescence (e.g., Lehr, 1969; Muuss, 1970; Tanner, 1962; Meredith, 1963) which indicate a general process of secular acceleration. Although these data are based on long-range comparisons, they can be taken as suggesting the existence of parallel accelerations (or correlates) in behavior characteristics.

Second, rigorous and comprehensive examinations of the nature of adolescent personality are badly needed. Despite the multitude of theoretical positions in the area (see e.g., Ausubel, 1955; Hurlock, 1968; Muuss, 1962, 1971; McCandless, 1970, for reviews), the adolescent period in general and adolescent personality in particular are underresearched areas (e.g., L'Abate, 1971). For example, although most theorizing conceives of adolescence as a period of intensive quantitative and qualitative change, consisting of a series of distinct stages and transitional periods exhibiting high instability, the empirical evidence for such propositions is either lacking or highly equivocal (e.g., Bandura, 1964).

It is particularly important to note that, with reference to personality variables, there is a dearth of research maintaining an emphasis on structured measurement (Cattell, 1957; Fiske, 1963) -- focusing on a comprehensive assessment of "clearly discovered ... and well established structures" (Cattell, 1957, p. 67). Moreover, there is a scarcity of longitudinal work, although it is increasingly being realized that repeated measurement designs are a sine qua non for a

thorough analysis of ontogenetic sequences (e.g., Baltes & Nesselroade, 1972; Wohlwill, 1970). This is so particularly in areas such as adolescence, where one expects not only large intraindividual change patterns but also, due to marked epoch-specific, class-specific, and family-specific conditions, large interindividual differences in ontogeny. It appears fair to conclude, therefore, that simple cross-sectional studies have very little to contribute of a positive nature, if the descriptive ontogeny of adolescence is the major goal of research.

Third, the period of adolescence is often seen not only as a distinct developmental stage that is characterized by marked biological, social, and behavioral changes but also by its central role in the origin and maintenance of cultural change patterns. In other words, adolescence is a 'critical period' (Eisenberg, 1965) of the life cycle not only for the developmental course of individuals, but also for the impact which adolescents, as a social entity, have on the changing society.

As Muuss (1962, p. 164), in line with Sherif's assertions, put it: "... societies in a period of rapid change create a particularly difficult adolescent period; the adolescent has not only the society's problems to adjust to but his own as well". Similar notions about the interwoven association between individual and societal change are most clearly inherent in those cultural and social interpretations of adolescent development which challenge the universality of adolescent phenomena and focus on culture- and time-specific contingencies. Note that the existence of cohort differences or generational changes are manifestations of such cultural change phenomena.

One may reasonably hypothesize that any short-term generational change will primarily affect those behavior classes that are largely determined by environmental and/or experiential conditions. Personality variables (such as anxiety, achievement, ego strength, etc.) are among the reponse classes that are generally assumed to be primarily determined by distinct learning histories and situational factors (e.g., Mischel, 1968; Vandenberg, 1966). In fact, the few time-lag studies aimed at comparing related behavior systems such as attitudes and interests in different cohorts of adolescents (e.g., Broderick & Fowler, 1961; Greenstein, 1964; Harris, 1957; Jones, 1960) consistently report signficant generational change in adolescents. None of these studies, however, appears to utilize adequate frameworks of measurement nor the type of designs necessary to disentangle ontogenetic from generational change components.

C. Statement of Problem

Recent evidence suggests the need for considering both ontogenetic (individual) and generational (historical) components of change in developmental research. The significance of such analyses is evident in light of our rapidly changing society and the increasing difficulty in predicting future societal trends on the basis of simple, continuous growth models.

Adolescent personality development is assumed to be particularly sensitive to cultural change phenomena. Moreover, adolescence is seen as being a "critical period" not only for the course of individual development but also for the prominent role adolescents play in shaping the direction of cultural development. Information about the nature and direction of the changing adolescent personality, therefore, is a necessary prerequisite both for the understanding of adolescence as a developmental phenomenon and for effective societal adjustments as implied in educational and psychological intervention programs.

Specifically, the present study is aimed at assessing the relationship between ontogenetic and generational change components in personality development of adolescents (age 13 - 18) from the cohorts 1951 through 1958. A large random sample (base sample N = 1877) is asked to respond in 1970, 1971, and 1972 to two structured personality questionnaires (Cattell's High School Personality Questionnaire, Jackson's Personality Research Form) and a battery of intelligence tests (Thurstone's Primary Mental Abilities). Using a strategy, termed multivariate longitudinal sequences, which includes the application of comparative factor analysis, the data analysis will concentrate on examining both quantitative and structural aspects of ontogenetic and generational change. The evidence obtained will be used to estimate developmental gradients for both ontogenetic and generational change in adolescent personality.

IV. METHOD

A. Design. The design, varying age, sex, and cohort membership, followed the data collection strategies outlined by Schaie (1965) and Baltes (1968). Table 1 provides a summary of the sequential design (longitudinal sequences) applied to investigate ontogenetic and generational components in adolescent personality development.

Table 1 on next page

Because of economic constraints, the proposed design collapses the complete General Developmental Model (Schaie, 1965) into a series of short-term longitudinal studies, each involving three times of measurement and extending for a period of two years. However, a noteworthy aspect of our design is that three times of measurement are sufficient to analyze the data by each of the three model-strategies (time-sequential, cohort-sequential, cross-sequential) specified in Schaie's (1965) model. The possibility of using all alternate designs is important, since either of the three model-strategies could result in the most parsimonious description of effects due to cohort, age, and time of measurement (see Baltes & Reinert, 1969; Baltes, Baltes & Reinert, 1970 for examples). The present design, however, can easily be expanded to encompass all age and cohort levels merely by adding further occasions of measurement.

One additional and highly significant feature of the research design is the inclusion of certain control groups to permit examination for confounds of selective drop-out and testing effects which so often preclude a forthright interpretation of longitudinal research (Baltes, 1968; Campbell & Stanley, 1963).

One control group consists of a new random sample, stratified by age and sex, drawn and tested at the second occasion of measurement (1971). These posttest control groups are crucial for answering the question whether apparent changes (e.g., from 1970 to 1971) in the longitudinal group merely reflect effects of repeated testing.

An additional control group consists of those subjects who, although tested initially in 1970, were not tested in 1971. To the extent that analysis of this group's data indicates that they have selectively dropped out, with respect to our measurement variables, the external validity (Campbell & Stanley, 1963) of the results of this research is jeopardized. For better or worse, this is information that must be taken into account before generalizing from the longitudinal sample to the base population.

TABLE 1

Short-Term Longitudinal Sequences for the Study of Adolescent Development[a]

Cohort	Sex	Age						
		13	14	15	16	17	18	
1959	m f	1972						
1958	m f	1971	1972					
1957	m f	1970	1971	1972				
1956	m f		1970	1971	1972			
1955	m f			1970	1971	1972		
1954	m f				1970	1971	1972	Phase 2
1953	m f					1970	1971	
1952	m f						1970	Phase 1

Note. -- Body entries represent times of observation (repeated measurement). Mean testing time (range ±2 months) is January 1 of the years given. Phase 1 and Phase 2 refer to budgetary and not to design units.

[a]To estimate testing and selective drop-out effects, a number of additional samples are being drawn in 1971 and 1972.

B. Measurement Variables. As mentioned above, the focus in selecting the measurement instruments is on comprehensively mapping, using a structured measurement approach, the universe of personality variables. The bulk of measurement variables, therefore, centers on personality (temperament) attributes. A small set of cognitive variables is included to mark the ability domain. The inclusion of measures from both the personality and ability domain enables us to assess differential interrelationships between personality and ability attributes throughout adolescence. Also, the inclusion of ability measures may allow preliminary extrapolations about generational change components in cognitive development during adolescence as well.

Table 2 gives an overview of the measuring instruments used. As marker variables for the ability domain, the subtests from Thurstone's

---

Table 2 on next page

(1962) Primary Mental Abilities (PMA) battery are being administered. The measurement instruments covering the personality/temperament domain are Cattell's (1964) High School Personality Questionnaire (HSPQ -- Form A) and the recently published Personality Research Form (PRF -- Form E) by Jackson (1968). Since the two personality systems are quite discrepant in both their underlying theory and development, it is hoped that in combined application they will afford a thorough mapping of the total sphere of personality, at least within the realm of questionnaire data.

The HSPQ is the adolescent version of the 16 PF (Cattell, Eber, & Tatsuoka, 1970), the latter being generally recognized as representing most distinctly the notion of convergence between a theory of personality structure and a corresponding set of measurement scales. Of the 14 psychological constructs operationalized in the HSPQ, eight are regarded as being affected by age-development in middle childhood and adolescence, although the available studies have failed to disentangle age from generation effects (e.g., Sealy & Cattell, 1966). An additional, more indirect source of evidence favoring the inclusion of HSPQ dimensions for closer scrutiny in developmental research is the finding by Cattell, Blewett, and Beloff (1955) that observed variance on these factors decomposes into environmental- and hereditary-attributable sources in a highly differential manner. For example, I,C,F, Q_2, and Q_4 were shown to be predominately environmentally determined dimensions. Accordingly, one might hypothesize them to be differentially more susceptible to generation differences, in contrast to the other dimensions, given the comparative stability of a gene pool over the time span of our research.

In contrast to Cattell's HSPQ, Jackson's PRF was not developed in the framework of the factor analytic model. Using a multivariate con-

TABLE 2

Measurement Systems: Primary Mental Abilities, High School Personality Questionnaire, Personality Research Form

Instrument	Variables	
I. Primary Mental Abilities (Thurstone & Thurstone, 1962)	1. Verbal Meaning 2. Space	3. Reasoning 4. Number Facility
II. High School Personality Questionnaire (Cattell, 1963)	1. Sizothymia 2. Intelligence 3. Ego Strength 4. Excitability 5. Dominance 6. Surgency 7. Superego	8. Parmia 9. Premsia 10. Coasthenia 11. Guilt Proneness 12. Self-sufficiency 13. Self-sentiment 14. Ergic Tension
III. Personality Research Form (Jackson, 1968)	1. Abasement 2. Achievement 3. Affiliation 4. Aggression 5. Autonomy 6. Change 7. Cognitive Structure 8. Defendence 9. Dominance 10. Endurance	11. Exhibition 12. Harmavoidance 13. Impulsivity 14. Nurturance 15. Order 16. Play 17. Sentience 18. Social Recognition 19. Succorance 20. Understanding

Note. -- Each of the HSPQ scales contains 10 items, whereas the PRF scales consist of 16 items each. The number of items included in the PMA scales varies: Verbal Meaning, N = 60; Space, N = 30; Number Facility, N = 30; and Reasoning, N = 70 (consisting of three subscales): Letter Series, N = 20; Word Grouping, N = 30; and Number Series, N = 20.

vergent and discriminant validation approach (Campbell & Fiske, 1959), this self-report inventory has been designed also to cover a broad spectrum of the behavioral universe, essentially as defined by Murray's framework for the description of personality. Furthermore, at least on the basis of content validity, the dimensions included in the PRF are similar to those emphasized in current research and theorizing on adolescent personality development. The dimensions of affiliation, aggression, autonomy, exhibition, impulsivity and social recognition, represent behavioral characteristics which are rarely neglected in any discussion of adolescent development. Moreover, one might expect that generational change will primarily concern such dimensions as achievement, aggression, exhibition, order, play, and social recognition. In this instance, however, the hypotheses must be speculative because of a lack of any systematic empirical evidence regarding nature-nurture relationships on PRF dimensions.

C. Subjects and Procedure. The subjects in this study are being drawn from 32 junior high and senior highschools in three West Virginia counties: Harrison, Wetzel, and Wood. The base population includes some 20,000 students. The sample, stratified by age and sex, was drawn at random from the school rosters. Summary data for the longitudinal, drop-out, and control group are presented in Table 3.

Table 3 on next page

The testing was done in classrooms during regular school periods with groups ranging in size from about 30 to 90. The test administrators were carefully trained and continuously supervised by the project directors and their graduate research assistants. Total testing time consisted of a four hour period which was divided into one morning (PMA, HSPQ) and one afternoon (PRF) session. In a few cases, both sessions were distributed over two days.

D. Data Analysis. The final data analysis follows, in general, the multivariate procedures outlined in Baltes & Nesselroade (1970, 1972). Specifically, it is aimed at (a) examining both structural and quantitative aspects of change, and (b) separating ontogenetic and generational change components. Although the present report on Phase I will not include information on structural comparisons (due to the fact that it is feasible to conduct comparative factor analysis only after data from all times of measurement are available), it appears reasonable to highlight the entire program of data analysis. Note, however that the present report includes analyses on the level of scales (quantitative change) only.

1. Structural and Quantitative Change

In the framework of multivariate analysis, a number of researchers have recently applied the concept of structured measurement to the an-

TABLE 3

Distribution of Subjects by Cohort, Sex, and Experimental Condition

Cohort	Longitudinal Sample 1970-71				Drop-out 1970-71				Control 1971		
	Male 1970 Age		Female 1970 Age		Male	%	Female	%	Male	Female	Total N
1950	—		—		2		—		—	—	2
1951	4		1		4		5		—	—	14
1952	15		12		14		7		9	2	59
1953	91	16:5	83	16:5	38	42%	51	61%	19	11	293
1954	138	15:5	117	15:5	43	31%	39	33%	28	29	394
1955	137	14:6	149	14:6	41	30%	42	28%	38	33	440
1956	136	13:6	156	13:6	42	31%	27	17%	30	39	430
1957	92	12:6	118	12:6	23	25%	18	15%	17	26	294
1958	—		—		0		1		—	—	1
Total N	613		636		207		190		141	140	1927

Note--Ages (years: month) are computed for 1970 time of measurement. Standard deviations range from 3-4 months.

alysis of developmental change. This line of reasoning has led to the formation of research strategies (Baltes & Nesselroade, 1970; Cattell, 1969) involving comparative factor analysis, which permit examination and cross-checking of three sets of information when comparing age groups: (1) factor loading pattern matrices, (2) factor intercorrelation matrices, and (3) the factor score matrices. The first two sets of information, it is argued, relate to the internal and external structure (Nunnally, 1967) of the factor constructs and appropriate comparisons using them to describe what has been labelled degree of structural or qualitative similarity and/or change. Information contained in the (either explicit or implied) factor score matrices, on the other hand, can be used to describe quantitative differences between the comparison groups on the factor constructs being investigated.

The examination of structural aspects of ontogenetic and generational change centers on using factor-matching rotation procedures (e.g., Meredith, 1964; Mosier, 1939) to compare the factor patterns for the various age, cohort, and sex groups on both the item and scale level. First, the degree of invariance (matching) is evaluated using baseline data generated from random data matrices (Nesselroade & Baltes, 1970; Nesselroade, Baltes, & Labouvie, 1971). Second, the structural comparison of factor patterns concentrates on examining systematic developmental change sequences. The factor patterns (separately for HSPQ, PRF, PMA) of adult Ss will be used as target solutions to be approximated, using appropriate rotational procedures, by the solutions for the younger age groups. Such a comparison strategy allows for the specification of the sequence of structural change in terms of the end product existing in young adulthood. Finally, the factor patterns, separately for age and sex, are examined in terms of their location on 'continua' of invariance (factor loading pattern) and stability (factor scores) as described in Baltes & Nesselroade (1972).

2. Ontogenetic vs. Generational Change

As outlined earlier, the analysis of generational and ontogenetic change components follows the strategies outlined by Schaie (1965) and Baltes (1968). Sample cases for the three types of strategies are given

Table 4 on next page

in Table 4. Depending upon the research question, the data matrix resulting from observing either independent or dependent samples from different cohorts at various ages (cross-sectional vs. longitudinal sequences) can be analyzed by either of three bifactorial combinations: Cohort by Time of Measurement (Cross-sequential method), Cohort by Age (Cohort-sequential method), and Time of Measurement by Age (Time-sequential method).

TABLE 4

Examples of the Three Basic Models-Strategies Using a Data Matrix Involving Three Ages, Three Cohorts, and Three Times of Measurement

Cohort (C)	Time of Measurement (T)								
	1970	1971	1972	1970	1971	1972	1970	1971	1972
1958			14[a]			14			14
1957		14	15		14	15		14	15
1956	14	15	16	14	15	16	14	15	16
Strategy	Cross-Sequential (T,C) Method			Cohort-Sequential (A,C) Method			Time-Sequential (A,T) Method		

[a] Body entries give ages at times of measurement.

Note. -- For further explanation of decision rules and interpretation of outcomes, see Schaie (1965, 1970) and Baltes (1968). Concrete examples comparing outcomes when applying different models of data analysis are presented in Schaie & Strother (1968a,b), Baltes & Reinert (1969), and Baltes, Baltes, & Reinert (1970).

Page 20

3. Present Analysis

The data reported in the present report, derived from two occasions of measurement only, could be analyzed either in a cross-sequential or a time-sequential arrangement. It was decided to adopt a cross-sequential model of data analysis for this initial exploration. This model varies cohort and time of measurement while confounding age. However, in contrast to the time-sequential model it allows for the analysis of repeated-measurement (intraindividual) characteristics.

Table 5 on next page

Table 5 depicts the arrangement chosen. The total pool of subjects participating both in the 1970 and 1971 data collection (retestees, N = 1217) was divided into five levels of cohort, each comprised of all subjects born within a given year (1953, 1954, 1955, 1956, 1957). Subsequently, separate 5 (cohort) by 2 (sex) by 2 (time of measurement) analyses of variance were performed for each of the 14 HSPQ dimensions (with repeated measurement on the time factor) to test for quantitative aspects of ontogenetic and generational change.

Two additional analyses were performed to gain information covering the internal and external validity of these results. First, focusing on the first-occasion data (1970) only, we examined, by means of a 2 (drop-out vs. retestees) by 5 (cohort) by 2 (sex) design, whether the longitudinal sample differs from the drop-out sample on any of the 14 HSPQ dimensions. Second, using the 1971 data, we checked to see if apparent changes from first to second occasion of measurement might be attributed to the effects of repeated testing. This involved a series of 2 (retestees vs. control) by 5 (cohort) by 2 (sex) analyses of variance -- one on each HSPQ dimension.

TABLE 5

Cross-Sequential Analysis of Adolescent Development

Mean Cohort	Number of Ss		Mean Time of Measurement	
	m	f	January 1970	January 1971
June 1957	92	118	12:6	13:6
June 1956	136	156	13:6	14:6
June 1955	137	149	14:6	15:6
June 1954	138	117	15:6	16:6
June 1953	91	83	16:6	17:6

Note. -- Body entries give approximate ages (years: months) at two times of measurement. Range of each cohort and age level comprises a one-year interval.

V. RESULTS

A. Overview of Results

The principal results of the 14 analyses of variance are summarized in Table 6, accepting a 1% level of significance. In addition, outcomes particularly relevant to generational change are shown in Figures 1-7. These figures, graph (a) the two cross-sectional gradients applying to the 1970 and 1971 times of measurement, and (b) the one-year longitudinal gradients obtained for each of the five cohorts. Such a presentation is an alternative illustration of the various main and interaction effects involving the cohort and time of measurement conditions.

Table 6 on next page

Although scale-specific outcomes will be discussed in greater detail in subsequent paragraphs, it appears helpful to highlight the main results summarized in Table 6. In this type of design, according to Baltes (1968), time differences (between 1970 and 1971) are seen as the only good indicators of 'true' longitudinal, cohort-specific age change occuring over one-year periods (12:6-13:6; 13:6-14:6; etc.) for each of the five cohorts. Interestingly enough, main effects of time were obtained for seven Factors (B,C,F,G,I,O,Q_3) of the 14 HSPQ dimensions.

Cohort differences -- in this design indicative of both cohort and cross-sectional age differences -- were obtained for a comparable number of dimensions (B,I,J,Q_2). None of the cohort by time interactions reached significance. Also, fortunately, all triple interactions were nonsignificant.

The major share of accountable variance is clearly due to main sex effects which were significant for 12 of the 14 dimensions. This is an interesting developmental finding but it is of secondary significance for the present report, except for the case of Factor C where a significant sex by time interaction was found.

In the following, the 14 HSPQ factors are first briefly characterized. Since all dimensions are bipolar they will be designated by both the descriptions for their low (-) and high (+) pole. The specifications are taken from Cattell and Cattell (1969) who, in addition to the technical names, give popular terms to assist the less familiar reader with the meaning of the HSPQ factors.

TABLE 6

Summary of Analyses of Longitudinal Data

SOURCE	df	HSPQ VARIABLES						
		A	B	C	D	E	F	G
Between Ss	1216							
COHORT (C)	4	1.3	7.1*	.8	2.4	.8	1.5	.5
SEX (S)	1	166.5*	33.4*	136.8*	.4	700.5*	27.4*	39.2*
C X S	4	1.0	2.2	2.4	1.3	1.6	1.5	2.7
Ss within Groups	1207							
Within Ss	1217							
TIME (T)	1	.4	46.7*	7.2*	2.7	1.9	36.5*	10.0*
C X T	4	2.1	.6	2.6	1.4	.3	3.2	2.1
S X T	1	1.1	1.9	9.7*	1.0	.3	2.6	.1
C X T X S	4	.4	1.5	.7	1.4	1.2	1.2	1.6
T by Ss within	1207							

Note. -- Body entries give F- values.

* $p < .01$

TABLE 6 (CONTINUED)

SOURCE	df	HSPQ VARIABLES						
		H	I	J	O	Q_2	Q_3	Q_4
Between Ss	1216							
COHORT (C)	4	.4	3.5*	3.7*	2.1	4.9*	.9	1.2
SEX (S)	1	85.3*	1678.0*	79.5*	31.0*	211.5*	4.2	27.9*
C X S	4	1.7	3.3	.8	2.4	2.1	2.1	2.8
Ss within Groups	1207							
Within Ss	1217							
TIME (T)	1	.1	12.9*	.0	12.1*	6.4	7.5*	1.2
C X T	4	1.4	1.1	2.3	.6	1.1	2.2	1.0
S X T	1	.4	1.0	.0	4.1	.1	.1	4.2
C X T X S	4	1.4	.7	.6	.2	1.1	.5	.6
T by Ss Within	1207							

Note. -- Body entries give F- values.

* $p < .01$

B. Scale-Specific Results

Factor A. Factor A (A- = Sizothymia: reserved, detached; A+ = Affectothymia: warm-hearted, outgoing) shows a strong main effect of sex only. Male adolescents are significantly lower ($\bar{X}$ = 9.65) than female adolescents ($\bar{X}$ = 11.96) on this dimension. The important implication for the present study is that this finding can be generalized to all ages and all cohorts. From a developmental perspective, this outcome suggests that strong sex differences on Sizothymia-Affectothymia emerge prior to age 12 and that these sex differences are maintained throughout adolescence.

Factor B. Factor B (B- = Low Intelligence: dull; B+ = High Intelligence: bright) is a brief measure of general ability. It exhibits main effects of cohort, sex and time. The main sex effect gives the females ($\bar{X}$ = 7.20) an edge over the males ($\bar{X}$ = 6.66). The relationship between cohort and time of testing is illustrated in Figure 1.

Figure 1 on next page

As expected, Figure 1 shows that both cross-sectional gradients exhibit a systematic age-related "increase" in general intelligence which is a reflection of the significant main effect of cohort. Note, however, that the one-year longitudinal gradients (reflecting a significant time effect) display sharper increments than the cross-sectional data, resulting for example in the fact that all 1971 subjects excel their 1970 same-age counterparts.

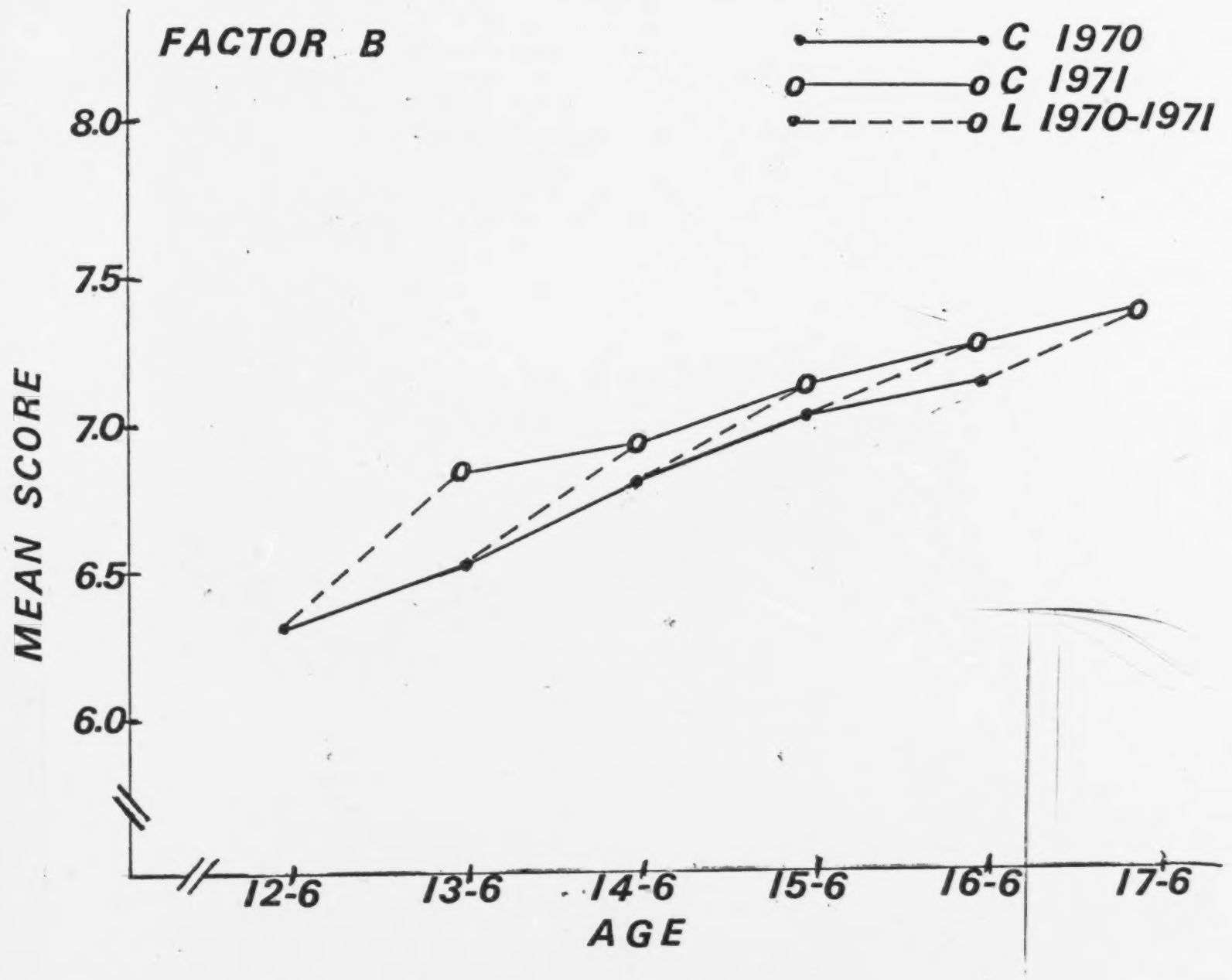
These results are especially remarkable since the magnitude of one-year longitudinal, cohort-specific age changes is comparable to the magnitude of about two-year cross-cohort age differences. Consider, for example, the phenomenon that 13:6 year-olds in 1971 perfrom on par with 14:6 year-olds in 1970. Control group data, discussed subsequently, indicate that these one year changes are not due to test-retest effects.

Factor C. Factor C (C- = Low Ego Strength: affected by feelings, emotionally less stable; C+ = High Ego Strength: emotionally stable, mature) manifests a main sex effect, a main time effect, and a significant sex by time interaction. The sex main effect gives evidence that male adolescents ($\bar{X}$ = 9.37) do have significantly higher ego strength than females ($\bar{X}$ = 7.49). The time main effect indicates that, overall, adolescents in 1971 were more emotionally stable ($\bar{X}$ = 8.53) than in 1970 ($\bar{X}$ = 8.27).

Figure 2 shows both the cross-sectional and longitudinal gradients separately for male and female adolescents to illustrate the signifi-

FIGURE 1

Comparison of Cross-Sectional with Longitudinal Gradients for Factor B



Note. -- C = Cross-Sectional, L = Longitudinal. Points connected by broken lines refer to mean (longitudinal) performance obtained by the same cohort at annual intervals (1970, 1971).

cant sex by time interaction. It can be seen that the significant

---

Figure 2 on next page

---

time effect (again reflecting one-year longitudinal, cohort-specific age changes) holds true consistently for males only; for whom all five cohorts exhibit systematic age-related increments in ego strength. Female adolescents, however, except for the 15:6 and 16:6 year-olds, (born in 1954 and 1953, respectively) do not show such age-related increments. Note also, that the cross-sectional gradients again do not appear to be good indicators of longitudinal age changes. This conclusion is most clearly supported by the fact that no significant cohort effect was obtained, although the cohort levels comprise cross-sectional age differences between five yearly age groups (12:6 - 17:6).

Factor D. It is surprising that Factor D (D- = Phlegmatic Temperament: undemonstrative, deliberate; D+ = Excitability: excitable, impatient) is not affected by any of the three design components. Most theoretical positions about adolescent development (e.g., Muuss, 1962 for review) seem to imply that this period should show some changes on a dimension of phlegmatic temperament - excitability paralleling the often stated emotional crises associated with transitional periods and the acquisition of new social roles, etc. Apparently, however, the adolescent period is not a main 'normative' period for the formation of individual differences in behaviors defining Factor D.

Factor E. Factor E (E- = Submissiveness: obedient, mild; E+ = Dominance: assertive, aggressive) shows a surprisingly similar picture. Although the highly significant main effect of sex, indicating that male adolescents ($\bar{X}$ = 10.38) are much more dominant than their female counterparts ($\bar{X}$ = 6.79), fits the standardization data and previous knowledge about sex differences on this dimension, it was unexpected that the age range from 12:6 - 17:6 would show neither systematic ontogenetic nor generational change. Again, a possible interpretation is that the critical socialization period for the emergence of sex differences in this class of behavior lies before age 12.

Factor F. Factor F (F- = Desurgency: sober, taciturn; F+ = Surgency: enthusiastic, heedless) displays both a main effect of sex and time of measurement. The sex differences indicate that male adolescents exhibit more surgency ($\bar{X}$ = 10.43) than females ($\bar{X}$ = 9.49).

Figure 3 unfolds the main effect of time which again points to marked discrepancies between cross-sectional and longitudinal gradients. Whereas both cross-sectional gradients give no evidence

of age-related differences (as indicated by the absence of significant cohort effects), the five longitudinal gradients (reflecting the significant main effect of time of measurement) show a consistent pattern

---

Figure 3 on next page

---

in that all five cohorts display increments in Factor F over one-year periods.

Factor G. Factor G (G- = Weak Superego Strength: disregards rules, expedient; G+ = Strong Superego Strength: conscientious, persistent) shows the same statistical pattern as Factor F, that is both main effects of sex and time. The sex effect indicates that female ($\bar{X}$ = 11.27) have higher superego strength than male adolescents ($\bar{X}$ = 10.25).

Figure 4 illustrates again the discrepancies between both cross-

---

Figure 4 on next page

---

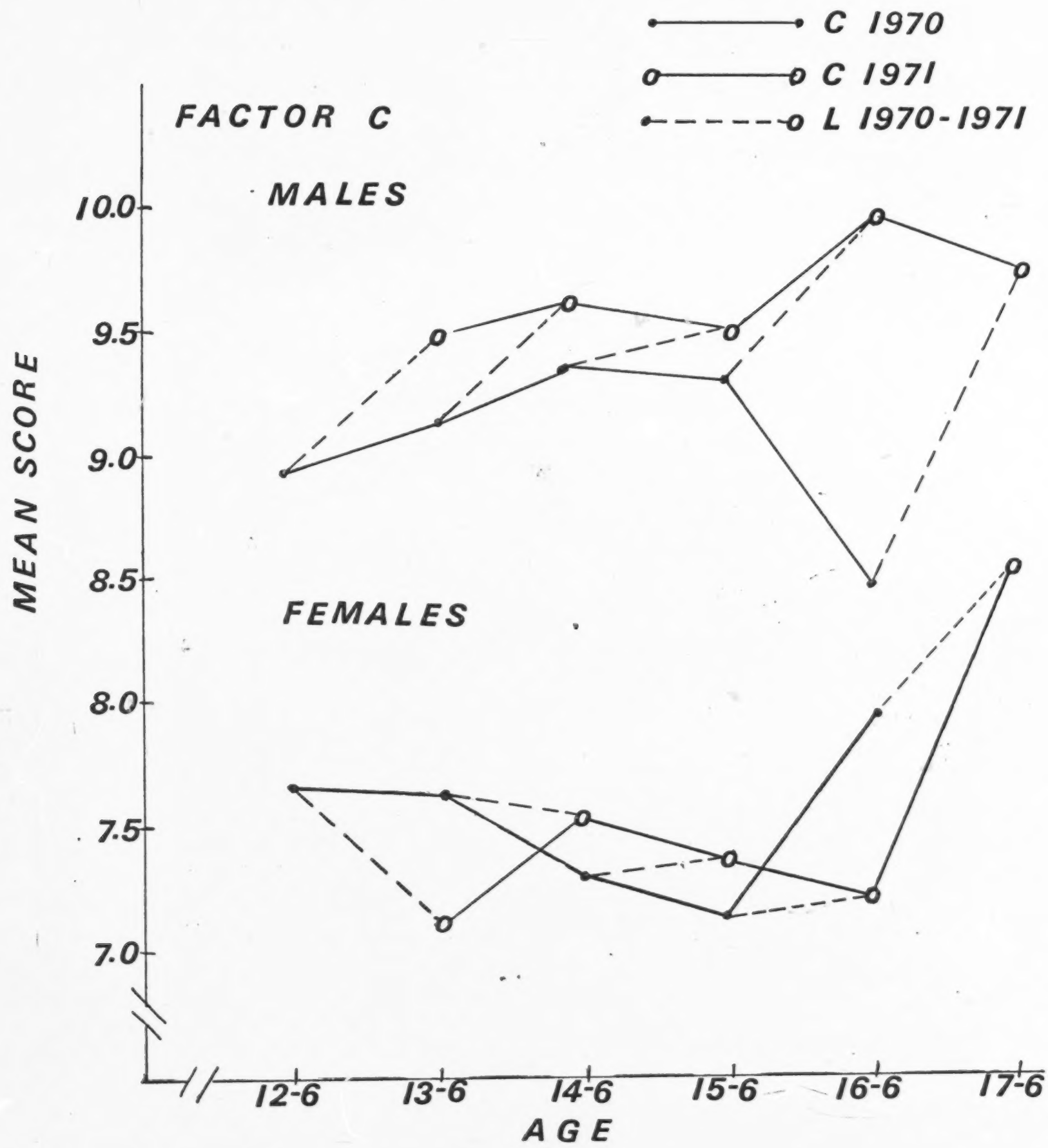
sectional gradients (lack of cohort effects suggests no age differences) and the five one-year longitudinal trends. The latter, with the exception of the age period from 15:6-16:6 (cohort 1954), exhibit a fairly consistent pattern of age decrements in superego strength. This is particularly true for the two youngest cohort and/or age groups, although this inference is not supported statistically due to a lack of a significant cohort by time interaction. Consistent with results for other HSPQ dimensions, this finding demonstrates that cross-sectional age differences, because of their confounding of age and cohort differences, are poor indicators of 'true', cohort-specific age changes.

Factor H. Factor H (H- = Threctia: shy, timid; H+ = Parmia: adventurous, thick-skinned) is another of those dimensions that, in contrast to common speculations about adolescents, does not show any significant cohort or time effects but a strong main sex effect only. This sex effect, in line with socialization expectancies, assigns higher values to male ($\bar{X}$ = 10.31) than to female ($\bar{X}$ = 8.69) adolescents.

Factor I. Factor I (I- = Harria: tough-minded, rejects illusions; I+ = Premsia: tender-minded, sensitive) displays the most complex picture of all dimensions included in the present report. All three conditions (cohort, sex, time) show main effects. The picture becomes less complex, when the magnitude of effects is considered. The main

FIGURE 2

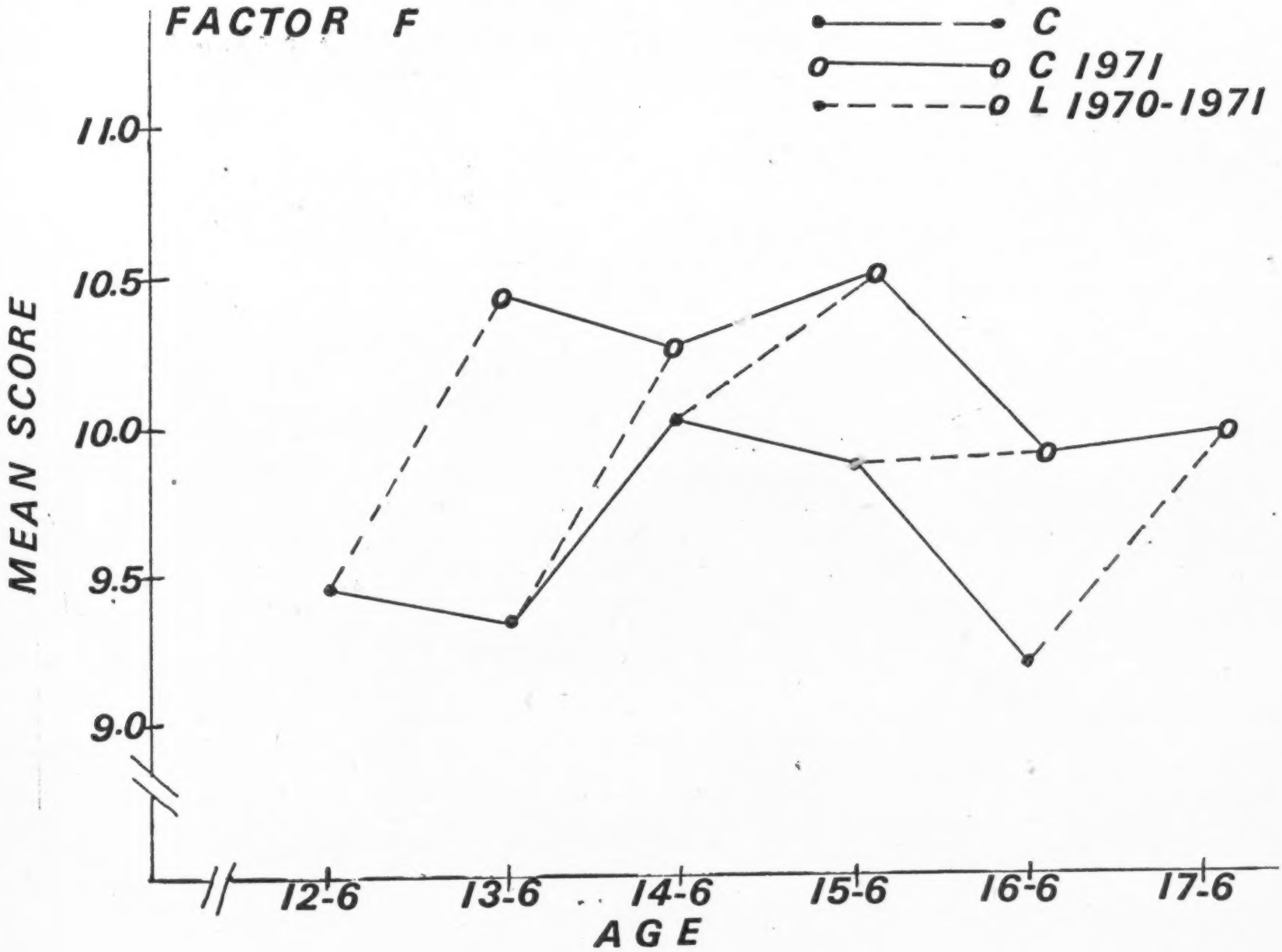
Comparison of Cross-Sectional with Longitudinal Gradients for Factor C



Note. -- C = Cross-Sectional, L = Longitudinal. Points connected by broken lines refer to mean (longitudinal) performance obtained by the same cohort at annual intervals (1970, 1971).

FIGURE 3

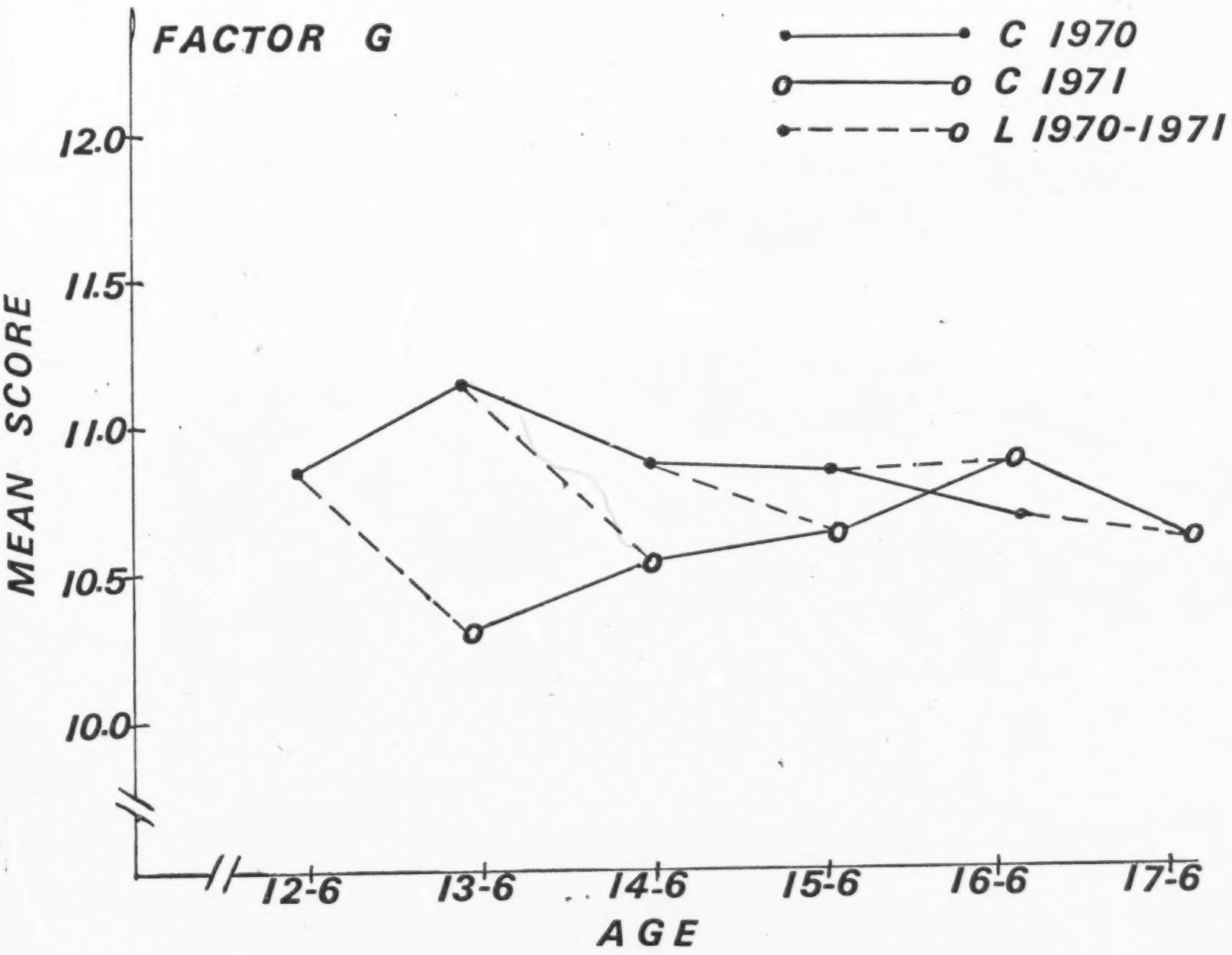
Comparison of Cross-Sectional with Longitudinal Gradients for Factor F



Note. -- C = Cross-Sectional, L = Longitudinal. Points connected by broken lines refer to mean (longitudinal) performance obtained by the same cohort at annual intervals (1970, 1971).

FIGURE 4

Comparison of Cross-Sectional with Longitudinal Gradients for Factor G



Note. -- C = Cross-Sectional, L = Longitudinal. Points connected by broken lines refer to mean (longitudinal) performance obtained by the same cohort at annual intervals (1970, 1971).

sex effect is associated with by far the largest share of variance with female adolescents ($\bar{X}$ = 14.10) being much higher on Factor I than their male peers ($\bar{X}$ = 6.78).

The cohort effect, though less strong than that for sex, indicates that the oldest cohort (16:6-17:6 year-olds born in 1953) exhibits a higher degree of Factor I ($\bar{X}$ = 11.03) than the remaining four cohort groups (1954: $\bar{X}$ = 9.97; 1955: $\bar{X}$ = 10.51; 1956: $\bar{X}$ = 10.73; 1957: $\bar{X}$ = 10.52). The relationship between time and cohort effects, being of prime interest in the present context, is graphed in Figure 5. Again, both cross-sectional outcomes present a confusing picture, resulting from the confounding of ontogenetic with generational change components.

Figure 5 on next page

The longitudinal one-year gradients, however, give a systematic and consistent pattern. All cohorts display an age-related decline on Factor I (become more tough-minded) over this period.

Factor J. Factor J (J- = Zeppia: zestful, liking group action; J+ = Coasthenia: circumspect individualism, reflective) shows significant main effects of cohort and sex.

The cohort main effect signifies that the oldest cohort (1953 at age 16:6-17:6) exhibits more Coasthenia ($\bar{X}$ = 9.26) than all remaining cohorts (1954: $\bar{X}$ = 8.59; 1955: $\bar{X}$ = 8.35; 1956: $\bar{X}$ = 8.61; 1957: $\bar{X}$ = 8.50). However, the absence of any time effects would suggest that this difference is less due to adolescent age change than to generational differences. Not in line with common socialization expectations is the strong sex main effect which places female adolescents ($\bar{X}$ = 7.98) lower on Factor J (i.e., more zestful, etc.) than their male peers ($\bar{X}$ = 9.29). Note again that the absence of any significant time effects implies that the sex typing period for Factor J appears to be located prior to age 12.

Factor O. Factor O (O- = Untroubled adequacy: self-assured, placid; O+ = Guilt proneness: apprehensive, self-reproaching) is another dimension that most adolescent theorists would assign a central role in adolescent development. Both the main effects of sex and time were significant.

The main effect of sex reflects the fact that females ($\bar{X}$ = 9.97) are higher on Factor O (more guilt-prone) than males ($\bar{X}$ = 9.08). This is in agreement with most positions and findings. The time effect is summarized in Figure 6.

1633

Figure 6 gives a clear-cut pattern. Although the cross-sectional cohort/age differences were not significant, the five short-term longitudinal trends present convincing evidence for a systematic, cohort-specific age-related change into the direction of 1971 adolescents becoming more self-assured than they were in the previous year (1970), independent upon their 1970 location on the Factor O dimension.

Factor Q_2. Factor Q_2 (Q_2- = Group Dependency: sociably group dependent; Q_2+ = Self-sufficiency: self-sufficient, resourceful) displays both main effects of cohort and sex.

Whereas the sex effect (Males: $\bar{X} = 9.75$; Females: $\bar{X} = 7.37$) is in accord with socialization goals assigning higher priority for self-

---

Figure 6 on next page

---

sufficiency to male adolescents than to females (e.g., Kagan & Moss, 1962), Figure 7 illustrating the cohort effect is less consistent. On a descriptive level, the cohort effect suggests that the oldest cohort (1953 at ages 16:6 and 17:6) shows more self-sufficiency than the remaining cohorts. Although this effect makes sense in an ontogenetic framework, the lack of significant one-year changes (time effect) seems to indicate again that this effect may be more a reflection of generational than ontogenetic components. This conclusion is

---

Figure 7 on next page

---

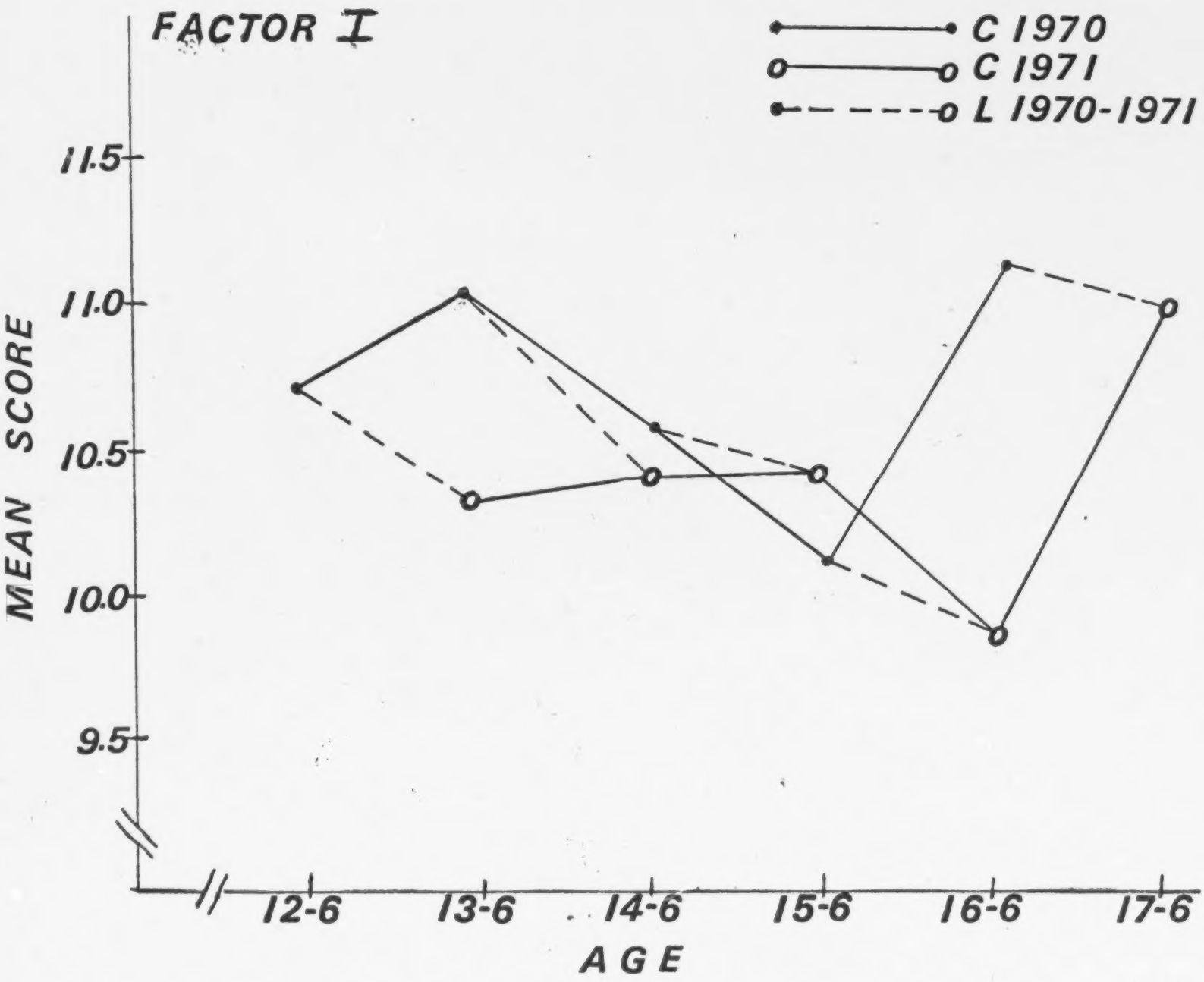
supported by the fact that none of the cohorts exhibits a longitudinal trend that would suggest that the younger adolescents are 'on their way up' to the level of self-sufficiency displayed by the oldest cohort.

Factor Q_3. Factor Q_3 (Q_3- = Low Self-sentiment integration: uncontrolled, lax; Q_3+ = High self-sentiment: controlled, exacting will power) exhibits a significant time effect only. The means indicate a decrease (adolescents become more lax and uncontrolled) from 1970 ($\bar{X} = 10.03$) to 1971 ($\bar{X} = 9.76$).

Factor Q_4. Factor Q_4 (Q_4- = Low Ergic Tension: relaxed, tranquil; Q_4+ = High ergic tension: tense, driven) is also not rich on systematic developmental effects. The only significant effect is a sex main effect with female adolescents ($\bar{X} = 11.09$) being more tense than males

FIGURE 5

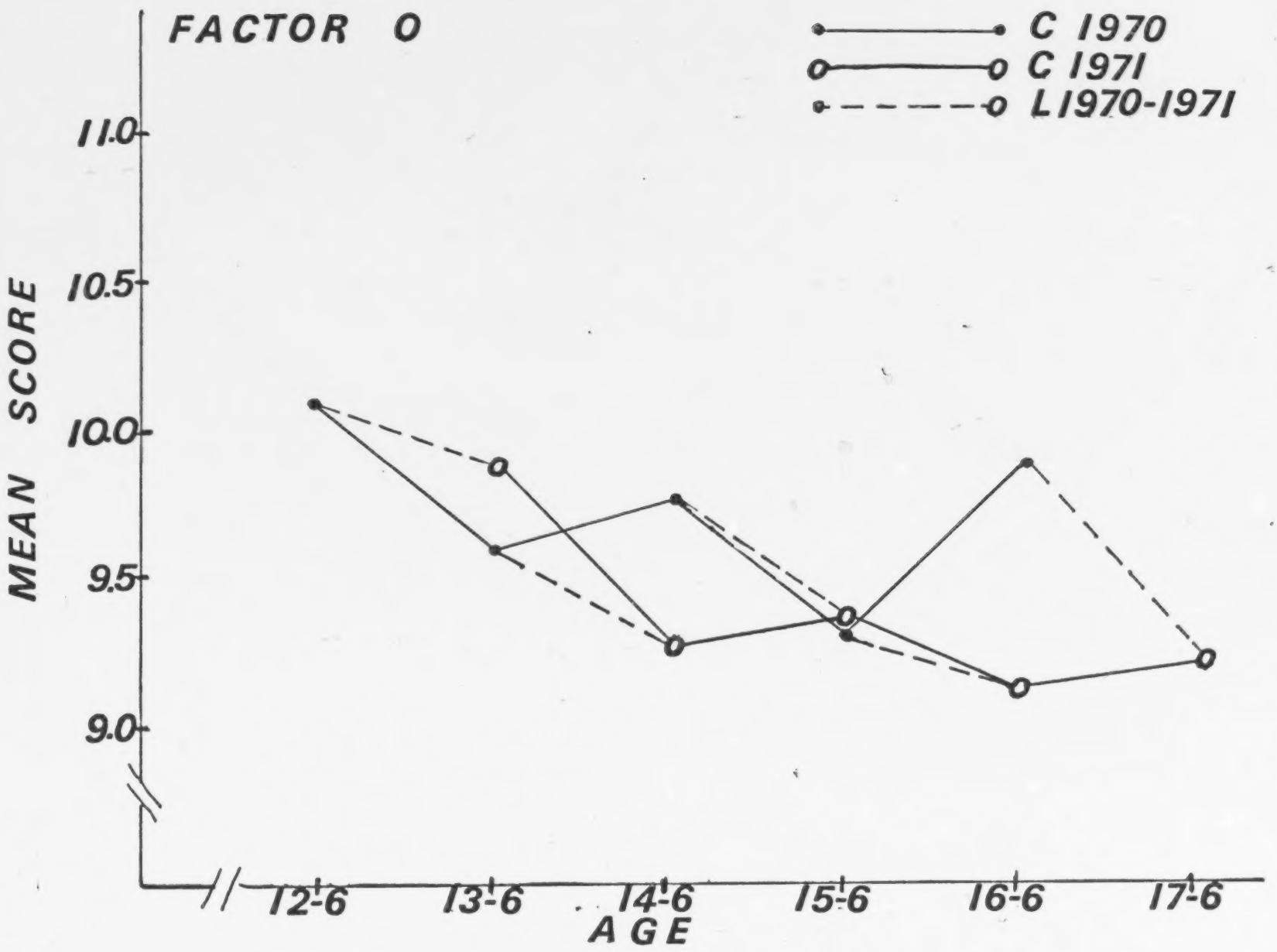
Comparison of Cross-Sectional with Longitudinal Gradients for Factor I



Note. — C = Cross-Sectional, L = Longitudinal. Points connected by broken lines refer to mean (longitudinal) performance obtained by the same cohort at annual intervals (1970, 1971).

FIGURE 6

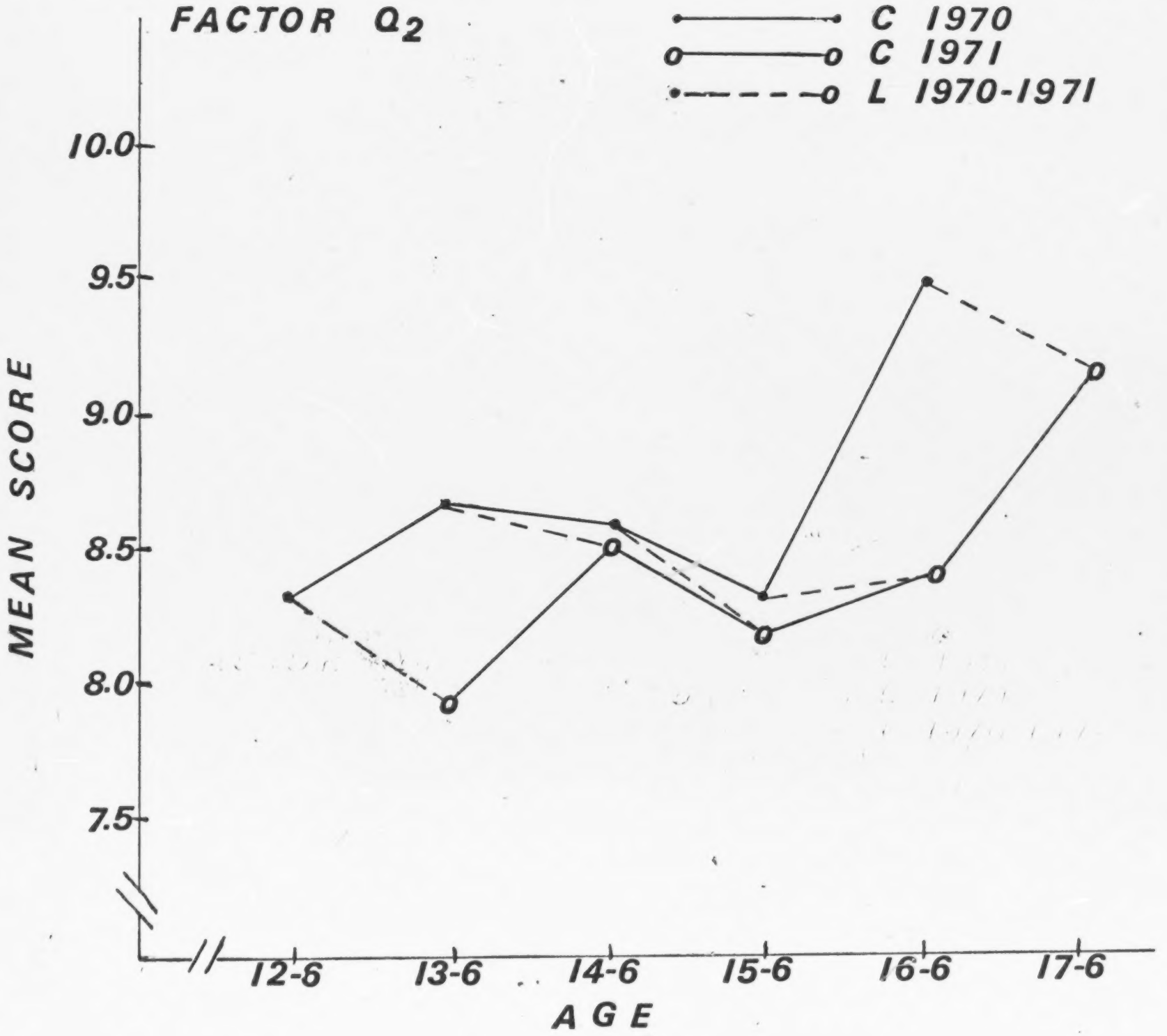
Comparison of Cross-Sectional with Longitudinal Gradients for Factor O



Note. — C = Cross-Sectional, L = Longitudinal. Points connected by broken lines refer to mean (longitudinal) performance obtained by the same cohort at annual intervals (1970, 1971).

FIGURE 7

Comparison of Cross-Sectional with Longitudinal Gradients for Factor Q_2



Note. -- C = Cross-Sectional, L = Longitudinal. Points connected by broken lines refer to mean (longitudinal) performance obtained by the same cohort at annual intervals (1970, 1971).

($\bar{X}$ = 10.18). Although this finding suggests that adolescence may be a more stressful period for girls than boys, the lack of any significant time or cohort effect implies that this situation applies to all age levels during adolescence and that the formation of this sex difference occurred prior to age 12.

C. Control Group Data

The importance of incorporating a posttest control group in the research design was discussed earlier. The relevant analyses of the control group data consisted of a series (one analysis on each of the 14 HSPQ scales) of 2 (retestees vs. control group) by 5 (cohort) by 2(sex) analyses of variance. Note that this involves only second occasion (1971) data -- retest scores for the longitudinal group and initial scores for the control group. The outcome of these analyses was both surprising and gratifying in that for none of the 14 HSPQ scales was there a statistically significant mean difference between the longitudinal group and the control group. Further, neither the group by cohort, the group by sex, nor the group by cohort by sex interactions attained significance. Thus we may conclude that the differences between occasions of measurement exhibited by the longitudinal group are not attributable to testing effects. The lack of significant interactions indicate that this conclusion holds for both sexes and for all cohorts.

The results of the analyses of variance comparing the longitudinal (1970 data) with the drop-out group (1970 data) are summarized in Table 7. A significant main effect of group was found for HSPQ scales B,G, and Q_3. Examination of means revealed that the drop-outs are less intelligent (B), lower on Superego strength (G), and lower on Self-sentiment (Q_3) than their contemporaries in the longitudinal group.

In addition to the group main effects just mensioned, three significant interactions were found. Scale F (Surgency) shows a Group by Cohort interaction; Scale I (Premsia) a Group by Sex interaction; and Scale D (Excitability) a Group by Cohort by Sex interaction. These significant effects require that generalization from the longitudinal data to the base population be appropriately qualified but their existence does not jeopardize conclusions about the changes occurring over time in the longitudinal sample.

Table 7 on next page

TABLE 7

Summary of Analyses of Longitudinal vs. Drop-out Group

SOURCE	df	HSPQ VARIABLES						
		A	B	C	D	E	F	G
Group (G)	1	0.5	15.4*	0.0	0.5	0.0	0.0	10.9*
G X Cohort (C)	4	0.9	1.4	0.6	0.5	1.2	3.8*	0.8
G X Sex (S)	1	0.6	0.0	0.9	0.0	2.0	0.1	0.1
G X C X S	4	1.0	2.0	0.5	5.6*	0.7	1.4	0.6

SOURCE	df	HSPQ VARIABLES						
		H	I	J	O	Q_2	Q_3	Q_4
Group (G)	1	0.5	0.9	2.7	0.9	2.1	6.9*	0.0
G X Cohort (C)	4	0.3	1.8	0.8	0.5	1.4	0.2	0.8
G X Sex (S)	1	0.6	10.8*	0.9	2.1	0.4	1.0	0.1
G X C X S	4	0.1	1.0	0.6	1.4	0.5	0.8	2.4

Note: Body entries give F- values. $df_{error} = 1562$ * p < .01

VI. DISCUSSION AND CONCLUSIONS

Since the investigation of the relationship between ontogenetic and generational change components in adolescent development is the primary objective of this study, the following discussion shall focus on this issue.

A. Cross-Sectional vs. Longitudinal Data.

In our judgment, the study presents convincing evidence that cohort differences play a major role in assessing adolescent personality. This outcome further substantiates the available evidence on cohort differences obtained with adult subjects (e.g., Schaie & Strother, 1968a,b; Schaie, 1970; Nesselroade et al., 1972). Correspondingly, the present results demonstrate that cross-cohort (cross-sectional) age gradients are fallacious indicators of 'true' cohort-specific age changes. In fact, the status of cross-sectional data as indicative of ontogenetic change is indeed seriously challenged, since all studies known to us which have attempted to assess the significance of cohort differences, have produced strong evidence of the extraordinary impact of generational change components.

In the present study, in all cases (Factors B,C,F,G,I,J,O,Q_2,Q_3) where significant ontogenetic trends were indicated (in terms of either main or interaction effects of cohort and time of measurement), the cross-sectional gradients do not coincide with longitudinal trends. This outcome, however disconcerting to those developmentalists interested in quick results, states very clearly that, at least where adolescent personality development is concerned, the cross-sectional method is not an acceptable short-cut ot studying change. Instead, cross-sectional, cross-cohort age differences represent a confound of ontogenetic and generational change and convey information about ontogenetic patterns that is clearly misleading.

B. Implications for Adolescent Development

Although we do not yet intend to examine, dimension for dimension, the significance of the present trends, it seems justifiable to highlight some of the preliminary implications.

First, with regard to the impact of generational differences, the outcome argues strongly against universal, stage-like patterns of adolescent personality development, at least within Cattell's framework of personality structure. The consistent discrepancy between cross-sectional and longitudinal data appears to offer no evidence for invariant and robust adolescent trends inherent in many biologically oriented models and conceptions that favor phase and/or stage-type approaches in the organization of adolescent development. In contrast, the present results suggest that the average standing of adolescents on personality dimensions is less dependent

upon their chronological age than upon the time of measurement (cultural moment) to which they are exposed. Witness, for example, that in many cases a 1970 13-year-old is less similar to a 1971 13-year-old than he is to an adolescent of different age (14,15, etc.) who has experienced the same segment of the time continuum (1970-71).

This position, delegating a lesser role to the age sequence per se but a major role to age-related patterns of cultural change is in agreement with a number of heretofore largely speculative propositions. There is Bloom's (1964; see also Baltes & Nesselroade, 1972) hypothesis that ontogenetic variation or change parallels largely environmental variation. There are also various social and anthropological interpretations of adolescence (see Muuss, 1962 for review) which focus on the cultural specificity and sociological determination of adolescent phenomena. However, the authors feel that none of these theoretical propositions would have assumed that one-year cohort differences would be of the magnitude reported here. Indeed, the present results present a serious challenge to conceptions of adolescence as representing a largely invariant sequence of systematic transitions in personality and as a period that implies invariant 'normative' developmental determinants for later ontogeny.

C. Implications for Monitoring Cultural Change

Although it is tempting to speculate about the determinants for the obtained time-specific changes in adolescent personality, we shall refrain from such efforts at the present time. In particular, we feel that the upcoming third time of measurement will provide us with more complete information on the directionality and stability of the generational and ontogenetic trends observed. Moreover, we would like to await completion of the ongoing analysis of the remaining measurement instruments (PRF,PMA) in order to check further into the generalizability of the present findings.

The present study, however, lends strong support to the need for applying sequential strategies in developmental research in order to disentangle individual from historical change components. Indeed, the data suggest that those aspects of society that are relevant in the shaping of adolescent personality currently are in a period of rapid social change. The dramatic impact of one-year time differences obtained in the first phase of this longitudinal project makes it imperative to carefully monitor the directionality of such change patterns. Our initial results and the prospects for what may come after the third data collection (1972) is completed and all scheduled analyses are performed are genuinely exciting.

VII. REFERENCES

Ausubel, D.P. Theory and problems of adolescent development. New York: Grune and Stratton, 1955.

Bachman, J.G., Kahn, R.L., Mednick, M.T., Davidson, T.N., & Johnston, L.D. Youth in transition, Vol. I, Blueprint for a longitudinal study of adolescent boys. Ann Arbor: Braun -- Brumfield, Inc., 1969.

Bakwin, H. The secular change in growth and development. Acta Paediatrica, 1964, 53, 79-89.

Baltes, P.B. Longitudinal and cross-sectional sequences in the study of age and generation effects. Human Development, 1968, 11, 145-171.

Baltes, P.B., Baltes, M.M., & Reinert, G. The relationship between time of measurement and age in cognitive development in children: An application of cross-sectional sequences. Human Development, 1970, 13, 258-268.

Baltes, P.B., & Nesselroade, J.R. Multivariate longitudinal and cross-sectional sequences for analyzing ontogenetic and generational change: A methodological note. Developmental Psychology, 1970, 2, 163-168.

Baltes, P.B., & Nesselroade, J.R. The developmental analysis of individual differences on multiple measures. In J.R. Nesselroade & H.W. Reese (Eds.), Life-span developmental psychology: methodological issues. New York: Academic Press, 1972, in press.

Baltes, P.B., & Reinert, G. Cohort effects in cognitive development of children as revealed by cross-sectional sequences. Developmental Psychology, 1969, 1, 169-177.

Baltes, P.B., Schaie, K.W., & Nardi, A.H. Age and experimental mortality in a seven year longitudinal study of cognitive behavior. Developmental Psychology, 1971, 5, 18-26.

Bandura, A. The stormy decade: Fact or fiction? Psychology in the Schools, 1964, 1, 224-231.

Bell, R.Q. Convergence: An accelerated longitudinal approach. Child Development, 1953, 24, 145-152.

Bloom, B.S. Stability and change in human characteristics. New York: Wiley, 1964.

Broderick, C.B., & Fowler, S.E. New patterns of relationships between the sexes among preadolescents. Marriage and Family Living, 1961, 23, 27-30.

Campbell, D.T., & Fiske, D.W. Convergent and discriminant validation by the multitrait -- multimethod matrix. Psychological Bulletin, 1959, 56, 81-105.

Campbell, D.T., & Stanley, J.C. Experimental and quasi-experimental designs for research on teaching. In N.L. Gage (Ed.), Handbook of research on teaching. Chicago: Rand McNally, 1963. Pp. 171-246.

Cattell, R.B Comparing factor trait and state scores across ages and cultures. Journal of Gerontology, 1969, 24, 348-360.

Cattell, R.B. The High School Personality Questionnaire. Champaign, Illinois: Institute for Personality and Ability Testing, 1964.

Cattell, R.B. Personality and motivation structure and measurement. New York: World, 1957.

Cattell, R.B., Blewett, D.B., and Beloff, J.R. The inheritance of personality. A multiple variance analysis determination of approximate nature-nurture ratios for primary personality factors in Q-data. American Journal of Human Genetics, 1955, 7, 122-146.

Cattell, R.B., & Cattell, Mary D.L. Handbook for the Jr.-Sr. High School Personality Questionnaire "HSPQ". Champaign, Illinois: Institute for Personality and Ability Testing, 1969.

Cattell, R.B., Eber, H.W., & Tatsuoka, M.M. Handbook for the sixteen personality factor questionnaire (16PF). Champaign, Illinois: Institute for Personality and Ability Testing, 1970.

Damon, A. Discrepancies between findings of longitudinal and cross-sectional studies in adult life: Physique and physiology. Human Development, 1965, 8, 16-22.

Davies, D.F. Mortality and morbidity statistics: I. Limitations of approaches to rates of aging. Journal of Gerontology, 1954, 9, 186-195.

Eisenberg, L. A developmental approach to adolescence. Children, 1965, 12, 131-135.

Fiske, D.W. Problems in measuring personality. In J.M. Wepman & R.W. Heine (Eds.), Concepts of personality. Chicago: Aldine, 1963. Pp. 449-473.

Flanagan, J.C., & Cooley, W.W. Project TALENT: One-year follow-up studies (Technical report to the U.S. Office of Education, Cooperative Research Project No. 2333), Pittsburgh: University of Pittsburgh Project TALENT Office, 1966.

Flanagan, J.C., Dailey, J.T., Shaycoft, M.F., Gorham, W.A., Orr, D.B., & Goldberg, I. Design for a study of American youth. Boston: Houghton Mifflin, 1962.

Greenstein, F.I. New light on changing American values: A forgotten body of survey data. Social Forces, 1964, 42, 441-450.

Harris, D.B. Sex differences in the life problems and interests of adolescents, 1935 and 1957. Child Development, 1959, 30, 453-459.

Hurlock, E.B. Developmental psychology, New York: McGraw-Hill, 1968.

Jackson, D.N. Personality Research Form. New York: Goshen, 1968.

Jones, M.C. A comparison of the attitudes and interests of ninth grade students over two decades. Journal of Educational Research, 1960, 51, 175-186.

Kagan, J., & Moss, H.A. Birth to maturity: A study in psychological development. New York: Wiley, 1962.

Kuhlen, R.G. Age and intelligence: The significance of cultural change in longitudinal vs. cross-sectional findings. Vita Humana, 1963, 6, 113-124.

L'Abate, Luciano. The status of adolescent psychology. Developmental Psychology, 1971, 4, 201-205.

Lehr, Ursula. Attitudes towards the future in old age. Human Development, 1967, 10, 230-238.

McCandless, B.R. Adolescents behavior and development. Hinsdale, Illinois: Dryden Press, 1970.

Meredith, H.V. Change in the stature and body weight of North American boys during the last 80 years. In L.P. Lipsitt and C.C. Spiker (Eds.), Advances in child development and behavior. New York: Academic Press, Vol. 1, 1963. Pp. 69-114.

Meredith, W. Rotation to achieve factorial invariance. Psychometrika, 1964, 29, 187-206.

Mischel, W. Personality and assessment. New York: Wiley, 1968.

Mosier, C.I. Determining a simple structure when loadings for certain tests are known. Psychometrika, 1939, 4, 149-162.

Muuss, R.E. Theories of adolescence. New York: Random House, 1962.

Muuss, R.E. Adolescent development and the secular trend. Adolescence, 1970, 5, 267-284.

Mauss, R.E. (Ed.), Adolescent behavior and society: A book of readings. New York: Random House, 1971.

Nesselroade, J.R., Baltes, P.B., & Labouvie, E.W. Evaluating factor invariance in oblique space: Baseline data generated from random numbers. Multivariate Behavioral Research, 1971, 6, 233-241.

Nesselroade, J.R., Schaie, K.W., & Baltes, P.B. Ontogenetic and generational components of structural and quantitative change in adult cognitive behavior. 1972 (submitted).

Nunnally, J.C. Psychometric theory. New York: McGraw-Hill, 1967.

Riegel, K.F. Research design on the study of aging and the prediction of retest-resistance and death. Paper presented at the meeting of the 8th International Congress of Gerontology, Washington, D.C., 1969.

Riegel, K.F. Development, drop, and death. Developmental Psychology, 1971, in press.

Schaie, K.W. A general model for the study of developmental problems. Psychological Bulletin, 1964, 64, 92-107.

Schaie, K.W. A reinterpretation of age-related changes in cognitive structure and functioning. In L.R. Goulet & P.B. Baltes (Eds.), Life-span developmental psychology: research and theory. New York: Academic Press, 1970, Pp. 485-507.

Schaie, K.W., & Strother, C.R. A cross-sectional study of age changes in cognitive behavior. Psychological Bulletin, 1968, 70, 671-680. (a)

Schaie, K.W., & Strother, C.R. The effects of time and cohort differences on the interpretation of age changes in cognitive behavior. Multivariate Behavioral Research, 1968, 3, 259-294. (b)

Sealy, A.P., & Cattell, R.B. Adolescent personality trends in primary factors measured on the 16PF and the HSPQ Questionnaires through ages 11-23. British Journal of Social and Clinical Psychology, 1966, 5, 172-184.

Tanner, J.M. Growth at adolescence. Oxford: Blackwell Publications, 1962.

Thurstone, L.L., & Thurstone, Thelma G. SRA Primary Mental Abilities. Chicago: Science Research Associates, 1962.

Vandenberg, S.G. Contributions of twin research to psychology. Psychological Bulletin, 1966, 66, 327-352.

Welford, A.T. Methode longitudinale et transversale dans les recherches sur le vieillissement. In Colloques Internationaux du Centre de la Recherche Scientifique (Ed.), Le vieillissement des fonctions psychologiques et psycho-physiologiques. Paris: Centre National, 1961, Pp. 31-44.

Wohlwill, J.F. Methodology and research strategy in the study of developmental change. In L.R. Goulet & P.B. Baltes (Eds.), Life-span developmental psychology: Research and theory. New York: Academic Press, 1970. Pp. 149-191.

APPENDIX A

A number of activities related to this investigation, although not dealing with the primary data of this study, were engaged in during the course of the granting period which this report summarizes. Before our data become available, several investigations, aimed at examining and testing models and developing and checking computer programs, especially ones dealing with structural comparisons, were launched and have since been completed. These will be reviewed, summarized and integrated into the more comprehensive final report terminating the second phase of the longitudinal study. Included are:

Baltes, P.B., Baltes, M.M., and Reinert, G. The relationship between time of measurement and age in cognitive development of children: An application of cross-sectional sequences. Human Development, 1970, 13, 258-268.

Baltes, P.B., Schaie, K.W., and Nardi, Ann H. Age and experimental mortality in a seven year longitudinal study of cognitive behavior. Developmental Psychology, 1971, 5, 18-26.

Baltes, P.B., and Goulet, L.R. Exploration of developmental parameters by manipulation and simulation of age differences in behavior. Human Development, 1971, 14, in press.

Baltes, P.B., Nesselroade, J.R., Schaie, K.W., and Labouvie, E.W. On a dilemma of regression effects in examining ability level-related differentials in ontogenetic patterns of intelligence. Developmental Psychology, 1971, in press.

Baltes, P.B., and Nesselroade, J.R. The developmental analysis of individual differences on multiple measures. In J.R. Nesselroade & H.W. Reese (Eds.), Life-span developmental psychology: Methodological issues. New York: Academic Press, 1972, in press.

Baltes, P.B., and Labouvie, Gisela V. Adult development of intellectual performance: Description, explanation, modification. In P. L. Lawton & C. Eisdorfer (Eds.), untitled. Washington: American Psychological Association, in press.

Nesselroade, J.R. Note on the "longitudinal factor analysis" model. Psychometrika, 1972, 37, in press.

Nesselroade, J.R., Baltes, P.B., and Labouvie, E.W. Evaluation of factor invariance in oblique space: Baseline data generated from random numbers. Multivariate Behavioral Research, 1971, 6, 233-241.

Nesselroade, J.R., and Cattell, R.B. Examination of short-term invariance and stability of personality factor structure in adults. (Submitted)

Nesselroade, J.R., Schaie, K.W., and Baltes, P.B. Ontogenetic and generational components of structural and quantitative change in adult cognitive behavior. (Submitted)